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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,302	07/24/2003	Satyadev R. Patel	P92-US	1903

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Gregory R. Muir  
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EXAMINER

THOMAS, BRANDI N

ART UNIT	PAPER NUMBER
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2873

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

1310

**Office Action Summary**

Application No.

10/627,302

Applicant(s)

PATEL ET AL.

Examiner

Brandi N Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on Amendment filed on 8/25/04.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 218-269 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 218-236 and 238-269 is/are rejected.
- 7) ☒ Claim(s) 237 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/29/04</u> . | 6) <input checked="" type="checkbox"/> Other: <u>Detailed Action</u> .                  |

## DETAILED ACTION

### *Information Disclosure Statement*

1. Acknowledgement is made of receipt of Information Disclosure Statement(s) (PTO-1449) filed 11/29/04. An initialed copy is attached to this Office Action.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 218-236 and 238-269 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doan et al. (US 2004/0156089 A1) in view of Pan (US 2003/0234994 A1).

Regarding claim 218, Doan et al. discloses, in figure 3, a spatial light modulator, comprising: an array of movable mirror plates (270) formed on a substrate for selectively reflecting a light beam incident on the mirror plates (270) (section 0013 and 0031) except that it does not show the adjacent mirror plates have a gap from 0.15 to 0.5 micrometers. Pan shows, in figures 2a, 2b, and 3b, that it is known to provide adjacent mirror plates have a gap from 0.15 to 0.5 micrometers to help minimize non-reflective surfaces on the surface of the mirror array and to keep the fill ratio high (section 0042). Therefore it would have been obvious to someone of ordinary skill in the art at the time the invention was made to combine the teaching of Doan et al. with the gap of the adjacent mirror plates of Pan for the purpose of helping to minimize non-reflective surfaces on the surface of the mirror array and to keep the fill ratio high (section 0042).

Regarding claim 219, Doan et al. discloses, in figure 3, a spatial light modulator, further comprising: a hinge (250) that is attached to each mirror plate (270) can rotate relative to a substrate (section 0013 and 0031) except that it does not show the hinge and the mirror plate is spaced apart from 0.15 to 0.45 micrometers. Pan shows, in figures 2a, 2b, and 3b, that it is known to provide the hinge and the mirror plate is spaced apart from 0.15 to 0.45 micrometers to help minimize non-reflective surfaces on the surface of the mirror array and to keep the fill ratio high (section 0042). Therefore it would have been obvious to someone of ordinary skill in the art at the time the invention was made to combine the teaching of Doan et al. with the spacing of the mirror and hinge of Pan for the purpose of helping to minimize non-reflective surfaces on the surface of the mirror array and to keep the fill ratio high (section 0042).

Regarding claims 220, 229, 230, and 231, Doan et al. and Pan disclose a spatial light modulator with an array of mirror plates except for the adjacent mirror plates of the array have a center-to-center distance from 4.38 to 10.16 micrometers, 6.23 to 9.34 micrometers, 4.38 to 6.57 micrometers, and 4.38 to 9.34 micrometers. It would have been obvious to modify the spatial light modulator to include a center-to-center distance from 4.38 to 10.16 micrometers, 6.23 to 9.34 micrometers, 4.38 to 6.57 micrometers, and 4.38 to 9.34 micrometers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include a center-to-center distance from 4.38 to 10.16 micrometers, 6.23 to 9.34 micrometers, 4.38 to 6.57 micrometers, and 4.38 to 9.34

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micrometers for the purpose of the capability of selectively reflecting a light beam incident onto the mirror plates.

Regarding claims 221-224, Pan discloses, in figure 1, a spatial light modulator including an array of mirror plates (204) but does not specifically disclose the number of mirror plates used in the spatial light modulator. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include a definite number of mirror plates used in the spatial light modulator for the purpose of the amount of light that will be reflected from the mirrors.

Regarding claims 225-228, Doan et al. and Pan disclose a spatial light modulator with an array of mirror plates when the adjacent mirror plates are parallel to the substrate (section 0040) except for the adjacent mirror plates have a gap from 0.5 micrometers or less, a gap from 0.5 to 0.8 micrometers, a gap from 0.8 to 1.25 micrometers, and. It would have been obvious to modify the spatial light modulator to include a gap from 0.5 micrometers or less, a gap from 0.5 to 0.8 micrometers, a gap from 0.8 to 1.25 micrometers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include a gap from 0.5 micrometers or less, a gap from 0.5 to 0.8 micrometers, a gap from 0.8 to 1.25 micrometers for the purpose of the capability of selectively reflecting a light beam incident onto the mirror plates.

Regarding claim 232, Doan et al. discloses, in figure 3, a spatial light modulator, wherein the hinge (250) is attached to the mirror plate (270) such that the mirror plate (270) can rotate

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relative to a substrate along a rotation axis that is parallel to but offset from a diagonal of the mirror plate (section 0013 and 0031) except that it does not show that the mirror plate can rotate to an angle at least 14 degrees relative to the substrate and wherein the adjacent mirror plates has a center-to-center distance from 4.38 to 10.16 micrometer, and wherein the hinge and the mirror plate is spaced apart from 0.15 to 0.25 micrometers. Pan shows, in figures 2a, 2b, and 3b, that it is known to provide that the mirror plate can rotate to an angle at least 14 degrees relative to the substrate and the hinge and the mirror plate is spaced apart from 0.15 to 0.45 micrometers to help minimize non-reflective surfaces on the surface of the mirror array and to keep the fill ratio high (section 0042). Therefore it would have been obvious to someone of ordinary skill in the art at the time the invention was made to combine the teaching of Doan et al. with the spacing of the mirror and hinge of Pan for the purpose of helping to minimize non-reflective surfaces on the surface of the mirror array and to keep the fill ratio high (section 0042). It would have been obvious to modify the spatial light modulator to include a center-to-center distance from 4.38 to 10.16 micrometers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include a center-to-center distance from 4.38 to 10.16 micrometers for the purpose of the capability of selectively reflecting a light beam incident onto the mirror plates.

Regarding claim 233, Doan et al. discloses a spatial light modulator, further comprising: an electrode proximate to each mirror plate for electrostatically deflecting the mirror plate (section 0030).

Regarding claim 234, Doan et al. discloses a spatial light modulator, wherein the substrate is glass or quartz that is visible light transmissive (section 0030).

Regarding claim 235, Doan et al. discloses a spatial light modulator, wherein the substrate comprises an anti-reflection film on a surface of the substrate (section 0061).

Regarding claim 236, Pan discloses a spatial light modulator wherein the substrate comprises a light absorption frame (106) around an edge (figure 1).

Regarding claim 238, Pan discloses a spatial light modulator, wherein each mirror plate rotates relative to the substrate in response to an electrostatic field (section 0042).

Regarding claim 239, Pan discloses a spatial light modulator, further comprising: a first electrode that drive the mirror plate in a first rotation direction relative to the substrate; and a second electrode that drives the mirror plate to rotate in a second rotation direction opposite to the first rotation direction relative to the substrate (section 0033).

Regarding claim 240, Pan discloses a spatial light modulator, wherein the first electrode and the second electrode are on the same side relative to the rotation axis of the mirror plate (section 0033).

Regarding claim 241, Pan discloses a spatial light modulator, wherein the first electrode and the second electrode are on the opposite side relative to the rotation axis of the mirror plate (section 0033).

Regarding claim 242, Doan et al. discloses a spatial light modulator wherein the substrate is a semiconductor (section 0036).

Regarding claims 243-246, Doan et al. and Pan disclose a spatial light modulator with an array of mirror plates when the adjacent mirror plates are parallel to the substrate (section 0040)

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except for the adjacent mirror plates have a gap from 0.15 to 0.25 micrometers, a gap from 0.25 to 0.5 micrometers, a gap from 0.5 micrometers or less, and. It would have been obvious to modify the spatial light modulator to include a gap from 0.15 to 0.25 micrometers, a gap from 0.25 to 0.5 micrometers, a gap from 0.5 micrometers or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include a gap from 0.15 to 0.25 micrometers, a gap from 0.25 to 0.5 micrometers, a gap from 0.5 micrometers or less for the purpose of the capability of selectively reflecting a light beam incident onto the mirror plates.

Regarding claim 247-260, Doan et al. and Pan disclose a spatial light modulator wherein the mirror plate (270) is attached to the hinge (250) such that the mirror plate (270) rotates in a first and second direction relative to the substrate (sections 0013 and 0031) except for the mirror plates rotating in a first direction to an angle from 15 degrees to 27 degrees, 17.5 degrees to 22.5 degrees, around 20 degrees, 12 degrees to 20 degrees, and around 30 degrees and the mirror plates rotating in a second direction to an angle from 2 degrees to 9 degrees. It would have been obvious to modify the spatial light modulator to include the mirror plates rotating in a first direction to an angle from 15 degrees to 27 degrees, 17.5 degrees to 22.5 degrees, around 20 degrees, and around 30 degrees and the mirror plates rotating in a second direction to an angle from 2 degrees to 9 degrees, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233). It would have been obvious to one having ordinary



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skill in the art at the time the invention was made to modify the spatial light modulator to include the mirror plates rotating in a first direction to an angle from 15 degrees to 27 degrees, 17.5 degrees to 22.5 degrees, around 20 degrees, and around 30 degrees and the mirror plates rotating in a second direction to an angle from 2 degrees to 9 degrees for the purpose of angling the mirror plates to produce a quality image.

Regarding claim 261, Doan et al. discloses a spatial light modulator wherein each mirror plate (270) is held on the substrate via a hinge (250) that is separated from the respective mirror plate by a gap (section 0013 and 0031).

Regarding claims 262-264, Doan et al. and Pan disclose a spatial light modulator with an array of mirror plates when the adjacent mirror plates are parallel to the substrate (section 0040) except for the adjacent mirror plates have a gap from 0.15 to 1.5 micrometers, a gap from 0.15 to 0.45 micrometers, a gap from 0.5 to 1.5 micrometers. It would have been obvious to modify the spatial light modulator to include a gap from 0.15 to 1.5 micrometers, a gap from 0.15 to 0.45 micrometers, a gap from 0.5 to 1.5 micrometers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include a gap from 0.15 to 1.5 micrometers, a gap from 0.15 to 0.45 micrometers, a gap from 0.5 to 1.5 micrometers for the purpose of the capability of selectively reflecting a light beam incident onto the mirror plates.

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4. Claims 265-269 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doan et al. (US 2004/0156089 A1) in view of Patel et al. (US 20040156090 A1).

Regarding claims 265 and 269, Doan et al. discloses, in figure 3, a spatial light modulator, comprising: an array of mirror devices (270) formed on a substrate for selectively reflecting light incident on the mirror devices, where each mirror device (270) comprises: a mirror plate for reflecting light; a hinge (250) attached to the mirror plate (270) such that the mirror plate can rotate relative to a substrate, and a hinge support on the substrate for holding the hinge on the substrate (section 0013 and 0031) except that it does not show a first lens, and a second lens. Patel et al. shows that it is known to provide a first lens and a second lens for directing light onto a display (section 0030). Therefore it would have been obvious to someone of ordinary skill in the art at the time the invention was made to combine the teaching of Doan et al. and Pan with the first and second lenses of Patel et al. for the purpose of helping to minimize non-reflective surfaces on the surface of the mirror array and to keep the fill ratio high (section 0042).

Regarding claims 266-268, Doan et al. and Pan disclose a projection system with an array of mirror plates when the adjacent mirror plates are parallel to the substrate (section 0040) except for an arc lamp having an effective arc length around 1.0 millimeter, less than 1.0 millimeter, and around 0.7 millimeter. It would have been obvious to modify the spatial light modulator to include arc lamp having an effective arc length around 1.0 millimeter, less than 1.0 millimeter, and around 0.7 millimeter, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 233). It would have been obvious to one having ordinary skill

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in the art at the time the invention was made to modify the spatial light modulator to include an arc lamp having an effective arc length around 1.0 millimeter, less than 1.0 millimeter, and around 0.7 millimeter for the purpose of wider range of reflectivity for the display target.

***Allowable Subject Matter***

5. Claim 237 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
6. The prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitations of the independent claim(s), in such a manner that a rejection under 35 U.S.C. 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed features as presented in claim(s) 237, wherein the claimed invention comprises a ratio of a summation of all areas of the mirror plates to an area of the substrate is 90 % or more, as claimed.

***Response to Arguments***

7. Applicant's arguments with respect to claims 218-269 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brandi N Thomas whose telephone number is 571-272-2341. The examiner can normally be reached on 8-5.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BNT

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December 22, 2004